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No. 9

Non-Relation of Malnutrition in School Children to Infection*

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THE PROBLEM

“LOWERED RESISTANCE” the result of fatigue, malnutrition, general poor health are offered many times daily by both profession and public to account for the incidence of an attack of infection or for misfortunes which may occur in the progress or outcome of an infection. What is this resistance thus said to be lowered? How strong a resistance is it? What diseases may it be considered to affect? There is much evidence that certain really definite “resistances” to infection (such resistances as those obtained by protective inoculations of toxins, etc.), when once established, cannot be “lowered” by any ordinary occurrences. For example, the person who has once recovered from smallpox or chickenpox as a rule will not thereafter contract smallpox or chickenpox respectively, even on the most intimate exposure, whether at the time of exposure he be in the highest health or be half-starved, half frozen, drunk, or diabetic. Evidently, then, some “resistances,” *i.e.*, those obtained by previous attacks, etc., cannot be “lowered” by any agency. On the other hand, there are many associations of malnutrition, chill, debauchery or existing disease with immediately subsequent attacks of infections, notably the respiratory infection such as common colds, bronchitis, pneumonia,

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tuberculosis, which lend colour to the teaching that "lowered resistance," in these respiratory diseases, may be a factor in their incidence. It is also true, however, that much evidence to the contrary may be adduced even in these respiratory infections, for attacks of colds, bronchitis, pneumonia and tuberculosis develop daily in persons who preceding the attack are apparently in the best of health.

The questions then not only of the mere existence of lowered resistance to the ordinary infectious diseases, but also of the circumstances and conditions which may affect such resistance or precipitate lowered resistance, are by no means closed.

That high health and high resistance to infection naturally go together and also poor health and low resistance, seems to be very generally held by the public and even by the medical profession. But when we consider the origin of the really definite resistances, such as the resistance to smallpox, chickenpox, typhoid fever, scarlet fever, etc., it is obvious at once that these resistances are not the products of health in any sense, but of disease—of a previous attack, of an inoculation of the corresponding toxin, or, antitoxin products, or other by-products of disease. There is, indeed, no evidence, in the infectious diseases, that high health has a causative relation to high resistance, but rather that high health has an inverse relation to high resistance; for the person whose previous history shows continuous uninterrupted high health (in the absence of exposure to infection) is more than likely to be susceptible rather than resistant to infectious diseases, since the very absence of previous infection has left him without any accumulation of those immunities such as most of us, with long sickness records, or exposures to infections, gather in time from such previous encounters with infection. This was notably true, on a large scale, in the Great War, where rural battalions suffered from outbreaks of infections much more than city battalions. The rural battalions had the physique, but the city battalions had the resistance—gathered from previous exposures, not from previous high health. In practice we all admit this, for in the matter of quarantine, when persons have been exposed to an infectious disease, we do not make enquiries as to the existence of a present state of high health, but ask whether the person has had this particular disease before. Quarantine or release takes place on this basis, and not on the basis of poor or good health at the time of exposure. Nevertheless, the idea that poor health and low resistance go together is so strongly held, that it seems worth while to review the evidence.

It was with the hope of contributing to these questions in one field, the relation of malnutrition to resistance against the infectious diseases

of childhood, that the investigation here reported was undertaken. Determinations of malnutrition amongst school children have now been made for a number of years in many places. It was suggested by one of us (H.W.H.) that, since the school children had been in many places separated into a mal-nourished group and a well-nourished group, it would not be difficult, although laborious, to discover from official records the amount of smallpox, chickenpox, mumps, etc., which had occurred among these children and then determine the relative numbers of infections which the mal-nourished and the well-nourished groups respectively supplied. Obviously, if malnutrition be a definite factor in increasing the incidence of infection, the mal-nourished children should supply cases of infection in greater proportion than the well-nourished.

THE METHODS

In undertaking this study, in Vancouver, the first step was to ascertain what data bearing on the subject were available, and whether the collecting and recording of the information had been such that it could be considered sufficiently accurate for our purpose.

A height-weight-age survey of all public school children had been made by the school nursing staff during the fall of 1924, and the classification into mal-nourished and well-nourished groups had been completed, using the standards, then generally employed, as prepared by Dr. Thomas D. Wood of Columbia University, New York. Each nurse had been supplied with a percentage table in order that the percentage classification be as accurate as possible. In this survey all children 10 per cent. or more underweight for height and age had been classified as mal-nourished. In the fall of 1925 also a similar survey was made; but the standards used then in classifying the children were the revised standards issued recently by Dr. Thos. D. Wood and Dr. Bird Baldwin, in which the weights regarded as normal are not so high as in the previous tables.

The application of the earlier standards in 1924 to the 16,242 children then in Vancouver Public Schools showed 25 per cent. of the children mal-nourished, seventy-five per cent. well-nourished. The application of the new standards, in 1925, to the 16,771 children then investigated showed only 16.7 per cent. of the children mal-nourished in 1925. This difference in percentages does not indicate any marked changes in the actual nutritional condition of the school children as a whole. In fact, there is no reason to believe that any great actual change took place. Most of the difference—the apparent improvement—between the 25 per cent. malnutrition of the 1924 (*i.e.*, six children mal-nourished out of

every twenty-four) and the 16.7 per cent. of the malnutrition in 1925 (*i.e.*, four children mal-nourished out of every twenty-four) was due merely to the change in standards; that is, of every twenty-four children, two who would have been placed in the group classed as mal-nourished in 1924, were placed in the group classed as well-nourished in 1925. It is from the reports of these surveys that the general and special malnutrition percentages have been taken.

Since all infectious diseases occurring among school children during the whole school year 1924-25 and for the school year 1925-26 to January 1926 had been recorded by name and age of the child, the school with which he was connected and the disease from which he suffered, the records of both the above groupings mal-nourished and well-nourished children as to subsequent disease during these periods were also available. After considering these records, it was felt that there was at hand sufficiently dependable material capable of yielding the required information, and it was decided to proceed with the investigation, following two plans, each the converse of the other.

Plan 1.—To determine the percentage of infection occurring amongst: (a) previously normal-weight children; (b) previously mal-nourished children. This would determine the relative incidence of infection in each of these groups, and therefore would indicate whether or not malnutrition appeared to invite infection.

Plan 2.—To list children who had contracted various infections and then to look up in the school records their previous nutritional standing. This would indicate from which class, mal-nourished or well-nourished, each such infected child came; and therefore whether infection picked out the mal-nourished in preference to the well-nourished, or otherwise.

THE RESULTS—PLAN 1

Plan 1.—Through reference to the height-weight-age records, the nutritional status of about 6,000 children—about 4,000 normal-weight and about 2,000 mal-nourished—was established. Reference thereafter to the infectious disease records yielded the information regarding infections suffered by the children in each of these groups. The results are shown in the following table:

TABLE I

(PLAN 1, A) 1924-25

Infections Occurring Among 1,089 Normal-Weight Children
(Selected from the Seymour and Alexandra Schools)

The well-nourished status of these 1,089 children was established from the school medical height-weight-age records made in September, 1924. The infectious

diseases recorded are those shown by the same records as occurring amongst these same children during the subsequent school year of 1924-1925.

1,089 WELL-NOURISHED CHILDREN

	<i>Scarlet Diph- Whooping Chicken Small</i>						
	<i>fever</i>	<i>theria</i>	<i>cough</i>	<i>pcx</i>	<i>pcx</i>	<i>Mumps</i>	<i>Totals</i>
No. of Children Infected	12	5	6	59	17	4	103
Percentage	1.1	.46	.55	5.4	1.5	.36	9.5

TABLE II
(PLAN 1, B) 1924-25

*Infections Occurring Amongst 1,016 Mal-Nourished Children
(Selected from the Alexandra, Charles Dickens, Dawson, Florence Nightingale,
Grandview and Laura Secord Schools)*

The malnutrition status of these 1,016 children was established from the school medical height-weight-age records made in September, 1924. The infectious diseases recorded are those shown by the same records as occurring amongst these same children during the subsequent school year of 1924-25.

1,016 MAL-NOURISHED CHILDREN

	<i>Scarlet Diph- Whooping Chicken Small</i>						
	<i>fever</i>	<i>theria</i>	<i>cough</i>	<i>pcx</i>	<i>pcx</i>	<i>Mumps</i>	<i>Totals</i>
No. of Children Infected	37	5	6	29	14	12	103
Percentage	3.6	.49	.59	2.8	1.3	1.1	10.1

From these two tables, I and II, it will be seen that the total incidence of these six infections was greater amongst the *mal-nourished* than amongst the *well-nourished* in the proportion of 10.1 to 9.5.

Omitting scarlet fever, the total incidence of infection in the remaining five diseases was greater amongst the *well-nourished* than amongst the *mal-nourished*, the proportion of 8.4 to 6.7.

It is striking that 1,016 mal-nourished children happened to furnish exactly the same number of infections as 1,089 well-nourished, and that, therefore, the ratio of these two figures to each other represents the total apparent relative effect, so far as these six diseases are concerned, of malnutrition in precipitating or of good nutrition in preventing an attack of infection. These two figures (1,016 and 1,089) are in proportion as ninety-five to 100; in other words, where a *mal-nourished* group might yield 100 cases of these six infections a similar but *well-nourished* group might be expected to yield about ninety-four cases.

If now we omit scarlet fever the mal-nourished yielded sixty-six infections, the well-nourished ninety-one infections. Hence in these five diseases (scarlet fever omitted) where a *mal-nourished* group might yield 100 cases of these five infections, a similar but *well-nourished* group might be expected to yield about 128 cases.

Plan No. 1 was followed also in 1925-26 in an exactly parallel manner, except that three separate sets of well-nourished children (about 1,000 in each set)

were recorded instead of only one set; the number of mal-nourished children recorded was exactly the same as in the previous year. The standards of mal-nutrition, however, had changed as already described, with the result that the school population of 1925-26 yielded only 16.7 of malnutrition as compared with 25 per cent. in 1924-25.

TABLE III

(PLAN 1, A) 1925-26

*Infections Occurring Amongst 1051 Normal-Weight Children
(September, 1925—January 31, 1926, inclusive)
(Attending the Laura Secord, Alexandra and Beaconsfield Schools)*

WELL-NOURISHED							
	Scarlet fever	Diph- theria	Whooping cough	Chicken pox	Mumps	Measles	Totals
No. of Children Infected	1	2	—	24	158	—	185
Percentage .....	.09	.19	—	2.28	15.03	—	17.60

INFECTIONS OCCURRING AMONGST 1,027 NORMAL-WEIGHT CHILDREN

*(September, 1925—January 31, 1926, inclusive)
(Attending General Gordon and Henry Hudson Schools)*

WELL-NOURISHED							
	Scarlet fever	Diph- theria	Whooping cough	Chicken pox	Mumps	Measles	Totals
No. of Children Infected	—	—	—	17	38	—	55
Percentage	—	—	—	1.65	3.70	—	5.35

INFECTIONS OCCURRING AMONGST 1,095 NORMAL-WEIGHT CHILDREN

*(September, 1925—January 31, 1926, inclusive)
(Attending the Beaconsfield, Kitsilano and Central Schools)*

WELL-NOURISHED							
	Scarlet fever	Diph- theria	Whooping cough	Chicken pox	Mumps	Measles	Totals
No. of Children Infected	3	1	1	9	53	1	68
Percentage .....	.27	.09	.09	.82	4.84	.09	6.11

THE ABOVE COMBINED—(3,173 NORMAL-WEIGHT)

	Scarlet fever	Diph- theria	Whooping cough	Chicken pox	Mumps	Measles	Totals
No. of Children Infected	4	3	1	50	249	1	308
Percentage	0.12	0.09	0.03	1.6	7.8	0.03	9.7

TABLE IV

(PLAN 1, B) 1925-26

INFECTIONS OCCURRING AMONGST 1,016 MAL-NOURISHED CHILDREN

*(September, 1925—January 31, 1926, inclusive)
(Attending Alexandra, Laura Secord, Beaconsfield, Kitsilano, Central, Charles Dickens, Dawson, General Gordon and Henry Hudson Schools)*

MAL-NOURISHED

	Scarlet fever	Diph-theria	Whooping cough	Chicken pox	Mumps	Measles	Totals
No. of Children Infected	1	1	2	15	79	—	98
Percentage .....	.09	.09	.19	1.47	7.77	—	9.64

From these two tables (III and IV) it will be seen that the incidence, of the six infections listed, upon the *well-nourished* was greater than upon the *mal-nourished* in the proportion of 9.7 to 9.64. This reverses the difference found in the previous year. (The six diseases here listed are the same as those listed in the previous year except that no cases of smallpox occurred in 1925-26, and but one case of measles, which latter disease was not recorded in 1924-25.)

If we count only the diseases which occurred in both years and then add together cases yielded by the mal-nourished of both years we find that the five diseases common to both years yield the following:

TABLE V

Table I	1,089	well-nourished	children	yielded	86	infections.....	7.9%
Table III.....	3,173	"	"	"	307	"	9.6%
	4,262	"	"	"	393	"	9.2%
Table II	1,016	mal-nourished	children	yielded	89	infections.....	8.7%
Table IV.....	1,016	"	"	"	98	"	9.6%
	2,032	"	"	"	187	"	9.2%

SUMMARY PLAN 1

Plan 1, therefore, shows no appreciable difference between the mal-nourished and well-nourished as to the *total percentage* affected by these infections.

THE RESULTS ON PLAN 2

TABLE VI

(1924-25—First Investigation)

Plan 2.—In carrying out this investigation it was necessary to discover the number of children who suffered from infectious disease and then to establish the nutritional status of each child as it was before infection. A comparison of the records of the infections occurring during the school year of 1924-25 with the height-weight-age records of the same year revealed the necessary information and showed the following result:

MAL-NOURISHMENT OCCURRING AMONGST 739 CHILDREN WHO SUFFERED FROM INFECTIOUS DISEASES

The facts of infection amongst these children during the school year 1924-25 was established from the school medical records. For each such infected child the nutritional status in September, 1924, was determined from the same records.

Note.—The nutritional standards used in 1924-25 established 25 per cent. as the proportion of malnutrition amongst the general school population of 16,242 children.

739 INFECTED CHILDREN

	Scarlet fever	Diph-theria	Measles	Whooping cough	Mumps	Chicken pox	Small-pox	Total
Mal-nourished	53	6	0	11	45	48	14	177
Well-nourished	96	20	1	40	174	187	44	562
	149	26	1	51	219	235	58	739

SAME IN PERCENTAGES								
	Scarlet fever	Diph- theria	Measles	Whooping cough	Mumps	Chicken- pox	Small- pox	Total
Mal-nourished	35.5	23.0	0	21.5	20.5	20.4	24.1	23.8
Well-nourished	64.5	77.0	100.0	78.5	79.5	79.6	75.9	76.2
			100.0	100.0	100.0	100.0	100.0	100.0
							100.0	100.0

Since, for these 739 children, the *normal* distribution of total infection would have been 25 per cent. to the mal-nourished, 75 per cent. to the well-nourished, the total *actual* incidence of infection is seen, from the above tables, to have been *slightly greater on the well-nourished*, in the ratio of 76.2 to 75; conversely, that the mal-nourished relatively escaped infection, in the proportion of 23.8 to 25.

TABLE VII

(1924-25—Second Investigation)

Mal-nourishment Occurring Amongst 246 Children Who Suffered from Infectious Diseases

This second investigation of the 1924-25 children differed from the first investigation (Table VI) only in that it was done somewhat later in the year. The malnutrition in the general school population was, of course, 25 per cent. here also.

246 INFECTED CHILDREN								
	Scarlet fever	Diph- theria	Measles	Whooping cough	Mumps	Chicken- pox	Small- pox	Total
Mal-nourished	15	5	0	3	14	37	11	85
Well-nourished	33	8	2	7	50	46	30	176
	48	13	2	10	64	83	41	261

THE SAME IN PERCENTAGES								
	Scarlet fever	Diph- theria	Measles	Whooping cough	Mumps	Chicken- pox	Small- pox	Total
Mal-nourished	31.25	38.4	0	30	22	44.6	27	32.5
Well-nourished	68.75	61.6	100	70	78	55.4	73	67.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The incidence of infection in these 246 children was greater on the mal-nourished in the proportions of 32.5 to 25; and conversely less on the well-nourished in the proportions of 67.5 to 75.

This table is given chiefly to illustrate (a) the variability of the figures obtained at different times, and especially (b) the "fallacies of small numbers." The former point (a) is strikingly illustrated by comparing the chicken-pox figures in Table VI, with those of Table VII. In Table V, 235 cases of chicken-pox showed but 20 per cent. of malnutrition, or one case mal-nourished to four well-nourished. In Table VI, eighty-three cases of chickenpox showed 44.6 per cent. of malnutrition, the mal-nourished forming nearly one-half the total, or about four cases mal-nourished to five well-nourished. The latter point (b) is illustrated obviously by measles; but also by whooping cough, in which the

transfer of one case from the mal-nourished to the well-nourished group would result in altering the percentage of malnutrition from 30 per cent to 20 per cent.

TABLE VIII

(1924-25—COMBINED FIGURES OF TABLES VI AND VII)

Mal-nourishment Occurring Amongst 1,000 Children Who Suffered From Infectious Diseases.

This table merely combines the previous two. The figures yielded are necessarily somewhat intermediate.

	Scarlet fever	Diph- theria	Measles	Whooping cough	Mumps	Chicken- pox	Small- pox	Total
Mal-nourished	68	11	0	14	59	85	25	262
Well-nourished	129	28	3	47	224	233	74	738
	197	39	3	61	283	318	99	1000

THE SAME IN PERCENTAGES

	Scarlet fever	Diph- theria	Measles	Whooping cough	Mumps	Chicken- pox	Small- pox	Total
Mal-nourished	34.5	28.2	0	22.9	20.8	26.6	25.2	26.2
Well-nourished	65.5	71.8	100	77.1	79.2	73.4	74.7	73.8
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

For the 1,000 children of Table VII show an incidence slightly greater on the mal-nourished, in the proportion of 25.2 to 25; conversely, slightly less on the well-nourished in the proportion of 73.8 to 75.

This reverses the incidence as shown in Table V, and, although it corresponds in direction with Table VI, it is very different in the actual percentages.

TABLE IX

(1925-26)

Mal-nourishment Occurring Amongst 875 Children Who Suffered from Infectious Diseases

The facts of infection amongst these children during the school year 1925-26, up to and including January, 1926, was established from the School Medical Dept. Records. For each such child the nutritional status in September, 1925, was determined from the same records.

Note: This investigation differs from those already given in that the nutritional standards used for these 875 children established 16.7% of malnutrition amongst the general school population, 16,771 children. This percentage of malnutrition is strikingly different from that (25%) established under the older standards used in 1924.

Note: No smallpox occurred amongst the school children during the period here dealt with.

875 INFECTED CHILDREN

	Scarlet fever	Diph- theria	Measles	Whooping cough	Chicken- pox	Small- pox	Total
Mal-nourished	6	4	0	3	137	19	169
Well-nourished	9	15	5	11	576	90	706
	15	19	5	14	713	109	875

THE SAME WITH PERCENTAGES

	<i>Scarlet fever</i>	<i>Diph- theria</i>	<i>Measles</i>	<i>Whooping cough</i>	<i>Mumps</i>	<i>Chicken- pox</i>	<i>Total</i>
Mal-nourished	40.0	21.0	0	21.4	19.2	17.4	19.4
Well-nourished	60.0	79.0	100	78.6	80.8	82.6	80.6
	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The total incidence on the mal-nourished is 19.4 per cent. as compared with the well-nourished of 16.7 per cent. and indicates a possible effect of malnutrition in precipitating about 2.7 per cent. of the total cases.

COMPARISON OF RESULTS OF PLAN 1 AND PLAN 2

In Plan 1, a number of well children, well-nourished, and an equal number of well children, mal-nourished, were examined to discover how many cases of infection each group would yield; in Plan 2 the converse procedure was followed; a given number of infected children were examined to ascertain their status of nutrition previous to infection. The former plan gives directly comparable figures, showing whether or not the well-nourished or the mal-nourished yielded the larger number of cases. The latter plan takes into account the relative number of the well-nourished and mal-nourished in the general run of children, and compares with this the relative numbers of well-nourished and mal-nourished amongst infected children.

The results of either plan may be translated into the terms of the other, very simply.

In Plan 1, equal numbers of well-nourished and mal-nourished respectively were compared directly. But the well-nourished in the general run of children were three times as numerous as the mal-nourished, by the 1924-25 standards, (*i.e.*, 25% mal-nourished, 1 in 4), and five times as numerous as the mal-nourished, by the 1925-26 standards (16.7% mal-nourished, *i.e.*, 1 in 6).

Hence by multiplying by three the number of cases yielded by the well-nourished group of 1924-25 we shall obtain a figure which when compared with that for the mal-nourished will indicate the relative numbers of well-nourished and mal-nourished amongst the infected in proportion to the distribution of mal-nourished and well-nourished in the general population. Of course, dividing the figures for the mal-nourished by three, leaving the well-nourished untouched, would give the same proportions. In the case of the 1925-26 figures, the multiplication (or division) must be by five instead of three.

Conversely, the results of Plan 2 may be made to yield direct figures from equal groups, instead of figures relative to the general distribution of malnutrition, by dividing the 1924-25 figures, for the well-nourished

by three, the 1925-26 figures by five (or multiplying the figures for the mal-nourished by three and five respectively).

If now we take the total records of the children examined by either plan and translate the figures of Plan 2 into the terms of Plan 1, we obtain the following:

TABLE X

Total records of Plan 1 and Plan 2, in terms of Plan 1.

Plan 1 showed (Table V) well-nourished children 4,262 yielding 9.2% of attacks.

Plan 1 showed (Table V) mal-nourished children 2,032 yielding 9.2% of attacks.

In these 6,294 children no effect of malnutrition on the incidence of total infection can be seen. The proportions of infection amongst equal numbers of the well-nourished and the mal-nourished were therefore as 1 to 1.

Plan 2 (Table VIII) showed that, in 1924-25, 1,000 infected children yielded 26.2 mal-nourished, 73.8 well-nourished, as against a "normal" distribution amongst 1,000 well children of 250 and 750 respectively. Since there were three times as many well-nourished as mal-nourished in the general population, equal members of each would have yielded cases in the proportions of 262 mal-nourished to 246 well-nourished, or of 738 mal-nourished to 696 well-nourished. These proportions compared with those of Plan 1, (1 to 1) would be 1.06 to 1.

September, some in October, November, and December as well allowing for this; however, we should find a reduction of the mal-nourished by one-seventh in January, which is almost exactly the departure from normal found in the 1925-26 figures, where 19.4 discounted by one-seventh (2.8) would yield 16.6, the normal being 16.7. This discrepancy again is well within the working error of the method.

Hence the conclusion that the incidence of total infection of the six diseases dealt with in the schools is not affected to an appreciable extent by the malnutrition or otherwise of the school children, each group, well-nourished and mal-nourished, showing practically identical incidence.

3. The incidence in different individual diseases varies much in the various tables, and is not consistent for any one disease. The existence of variation in itself throws doubt upon the existence of a *general* resistance to infection, lowerable by a *general* cause such as malnutrition; for if a *general* resistance existed and was lowered in any one disease, it would seem reasonable to suppose it would necessarily be lowered in

all. But where our tables show the resistance apparently lowered quite definitely to scarlet fever, they also show that it was at the same time raised to chickenpox (Tables I and II); and similarly in various degrees in other tables.

Concerning scarlet fever, it may be worth while to point out that a previous investigation (Kobrak, *Jour. Am. Med. Ass.*, Nov. 2, 1920), observed exactly the opposite incidence for this disease, concluding that scarlet fever incidence corresponded with wealth and over-nutrition. He quotes also in Berlin under the pre-war conditions of 1911, 6772 cases; in 1918 and 1919, when malnutrition was the rule, 1962 and 1622 cases respectively. I do not think that he has made his point, but his figures certainly do not support the teaching that malnutrition conduces to infection.

4. Recent experiments by Spaeth and others show little of any lowering of resistance to infection, sometimes quite the reverse, as the result of fatigue and of mal-nourishment. It is therefore well to consider carefully our teachings in this line and investigate further before reiterating daily to all comers as infallible and universal a doctrine which daily experiment and every day observations show to have very many exceptions, contradictions and discrepancies.

It should be needless to add that the benefits of good nutrition are too obvious, in developing the body, in securing efficiency, general well-being and physical capacity for enjoyment to require any laudation here. It is not an advocacy of mal-nutrition to point out that it has one less defect than has usually been attributed to it; nor is it depreciatory of good nutrition to point out that one advantage it never possessed has been improperly credited to it.

An interesting side line it may be added that, of 16 diphtheria carriers, discovered amongst the children in 1924-25, four were mal-nourished, twelve well-nourished, *i.e.*, the malnutrition of the diphtheria carriers was exactly that of the general school population.

We attempted to determine whether there was a relation between malnutrition and the outcome of infection. For this purpose we listed the deaths amongst the school population, and looked up the nutritional record of these decedents. Of a total of two deaths, none were mal-nourished. This figure is, of course, usually inadequate for any conclusion whatever.

Conclusions.—This investigation of about 8,000 records of school children in Vancouver yields no evidence of any relation between mal-nutrition and the incidence of infection; each group, well-nourished and mal-nourished, showing practically identical incidence of infection.

Venereal Disease Control in the Province of Quebec

By DR. A. H. DESLOGES, Chevalier de la Légion d'honneur,
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LET me tell you first that I greatly appreciate the privilege given me of addressing this distinguished meeting. Were it not for the assurance of your kindness, I would hesitate to shoulder the responsibility of speaking the English language, of which I regret to possess only a limited knowledge.

I am very glad to have this opportunity of offering my most sincere thanks to the Canadian Social Hygiene Council. It is a great pleasure for me to publicly admit that if, in the Province of Quebec, the campaign against venereal diseases attained a certain degree of success, it is in part due to the kind and experienced cooperation of Dr. Gordon Bates. But these good results which we have obtained have their starting point in the active collaboration, by which they were rendered possible, of the Hon. Mr. Taschereau, Prime Minister of the Province of Quebec, and his brilliant colleague, the Hon. Mr. David, Provincial Secretary. Mr. David, a very able lawyer, who directs all hygiene questions in the Provincial Government, gathered all possible information on the question of combating venereal diseases. It, therefore, is my duty to thank my Government and the Hon. Mr. David.

And now, after over five years of arduous work, it is possible to note a great diminution in the ravages of venereal disease and to expect further success in the future. May I express the wish that you, of the Canadian Social Hygiene Council, and you, coworkers in all problems of health, may continue to enlighten us on this subject?

I am encouraged in coming before you, gentlemen, by the recollection that I have already been introduced to you. You may remember that, some two years ago, the newspapers of Canada introduced me to the world as the Quebec alienist who believed the whole world was going crazy.

I am glad to be able to take a more cheerful tone on this occasion. I firmly believe we are making progress with this work, and that the day is coming when infection with venereal disease, if not an impossibility, will be indeed a rare event.

Read before the Canadian Health Congress, May 7th, 1926.

On the question of sanity, however, I do not know that anything has happened in the past two years to cause me to alter my opinion.

You would perhaps be interested to know that in my Province of Quebec, we had to contend with the same state of things that is met elsewhere, only more intensified, when a medical movement which is intimately connected with morals has to be submitted and accepted by the people at large. From the first, it has been our aim to convince those who are in charge of teaching and safeguarding the moral principles of the people that this problem of the social evil is not only a medical question, but also, and specially, a moral question.

I must say, to the praise of our priests and pastors, that this did not entail hard work on our part, because they heartily joined us in our enterprise. The ecclesiastical authorities without exception, cardinal, archbishops, bishops, and priests, have from the start given us powerful help. You, therefore, can imagine the great moral influence which was put to our service. The result was this: without any local organization in the different cities and centres of the Province, there was a committee of 4,000 to 5,000 priests and religious teachers ready-made and willing to do their utmost to help us in our propaganda.

We were invited by priests and pastors to give lectures in almost every parish of the Province, and we were received in parish halls and schools. We were introduced by the local clergy, who called the attention of their audiences to the fact that they had been counselled as to the moral aspect of this question by their priests and pastors, but that now authorized physicians were going to present to them the question from the medical standpoint. These lectures were rendered more interesting by the showing of films. Even those prepared for physicians and medical students were found to be beneficial for the whole population. We, of course, made it our duty to explain and comment on them extensively while they were being shown on the screen. Our audiences realized in this way the importance of early and prolonged treatment so as not to be liable to incur the immediate and ultimate consequences of venereal disease. These lectures were given to men, women, girls, and boys separately. The following table indicates to some extent the progress made in getting cases under treatment:

	1921	1922	1923	1924	1925	Grand total
New patients admitted in clinics	4970	7513	7773	8809	9446	38515
Treatments administered in clinics	50503	67742	99286	105401	119259	442191

The following figures indicate what has been accomplished in the different centres of treatment and the laboratories (2) of the Division of Venereal Disease of the Province of Quebec, during 1925:

31,577 patients presented themselves to the different centres of treatment; 9,448 were new patients. Altogether 119,259 treatments were administered, out of which 61,555 were arsenical and other injections.

The new cases of syphilis numbered 2,974, 659 being primary and 996 secondary cases, the balance being tertiary 542, latent 444, nervous 196 and congenital 137. The 659 primary and 996 secondary cases give a total of 1,655, or 59%, of the new cases of syphilis. This large percentage indicates more than ever the necessity of continuing the campaign against venereal diseases.

The new cases of gonorrhoea numbered 3,482. This total, compared with the total of new cases of syphilis, would leave one under the impression that the cases of gonorrhoea are rather scarce in our Province. But this total does not show the exact number of gonorrhoea cases. Very many patients suffering from gonorrhoea take a personal treatment instead of going to a clinic, and after a few weeks, thinking themselves cured, continue to spread gonorrhoea among the population; others follow the direction of their family physician and only come to the clinic when there is a complication to their case.

The balance of the new cases, taking away the syphilis and gonorrhoea cases, represent soft chancre and non-venereal cases, and also patients who come to the clinic to ascertain through an examination, before contracting marriage, whether they are cured or not.

The total of the Bordet-Wassermann reactions made at our two laboratories is 21,499, positive reactions 5,560, about 25%.

You will appreciate that the general practitioners are taking advantage of our laboratories, where free serological and microscopical examinations are made, to diagnose their cases of syphilis and gonorrhoea; they sent 9,966 specimens of blood; 2,997 were found to be positive. About 46% of all the Bordet-Wassermann reactions came from the practitioners.

The spinal fluid was examined in 480 cases and was found to be positive in 94 cases.

Many of our general hospitals have their own laboratory, where 10,094 Wassermann reactions were made, 1,996 positive.

In most of our general hospitals, laying-in hospitals, hospitals for children, for insane, sanatoria for tubercular patients, reformatory schools, etc., a routine Wassermann is made for all patients, and our laboratories have furnished us with the following figures:

General Hospitals	6011 reactions	1542 positive
Laying-in Hospitals	1258 „	82 „
Hospitals for children	451 „	43 „
Sanatoria for tubercular..	958 „	82 „
Jails	1301 „	486 „
Reformatory Schools	49 „	4 „
Insane Hospitals	1233 „	267 „
Other clinics and hosp.	272 „	57 „

The figures relating to the Hospitals for children are not exact, because it is a known fact that in most of all the cases of congenital and infantile syphilis, the Bordet-Wassermann reaction is negative.

7,123 microscopical examinations were made (1,293 positive) for the finding of gonococci. 123 other microscopical examinations were made (40 positive) for the finding of spirochitis, bacilla of Ducrey, etc. In this last total is included the number of chemical and cytological examinations (85).

In cases of gonorrhoea the total of the positive microscopical examinations should be greater, but as you are aware, we presently only have the Craam reaction, which fails in many cases. The examination being negative does not mean that the patient is not infected, and in several cases the collecting of the pus is not always done in a most scientific way.

We presently have throughout the Province over 52 centres of treatment.

I hope I have not bored you with all these figures which I have given you, but I think they will be of interest to the specialist, the health officer, and even to the practitioner.

I do not want to give you the impression that the Province of Quebec is more infected than any other Province or country of the world. I believe in the contrary. But our population being enlightened through intensive education goes to the free clinics, etc., to receive adequate treatment.

If such results have been obtained it is in part due to the cooperation of the medical profession, and particularly of those in charge of the treatment of venereal disease in our large clinics which are under the scientific direction of our Universities.

Not only was the educational propaganda among the people of the greatest importance, but also the scientific information furnished to the medical profession at large. For that purpose medical literature and information, both our own and a great contribution from the Federal Board of Health, was largely distributed to the medical profession. I

take here the liberty of thanking Dr. John H. Stokes, late of the Mayo Clinic, whose book, which we translated into French, is of great value to the physicians of the Province; it was also distributed in different European countries. But in order to be still more practical and to have better results, we organized a special post-graduate course in venereology. Doctor Fannier, Professor of Syphilology at the University of Strasbourg, and formerly of the Hospital St. Louis, Paris, came to Montreal, and was the lecturer in syphilology at the University of Montreal, and at Laval University, Quebec, during the month of September, 1925. His lectures were largely attended by the medical profession of the Province of Quebec.

May I mention an after effect of our educational and scientific propaganda? Several practitioners report a diminution in the number of their venereal patients, whereas specialists register an increase. This is easily explained by the fact that the patients, realizing better the gravity of their state, prefer to be attended by physicians specializing in their diseases, in order to be cured more quickly. Other results are that patients now consult and visit their physician at the beginning of their disease, and secondary symptoms and classic lesions are now so very scarce that the professors at the University have difficulty in showing such cases to medical students.

Our methods are subject, nevertheless, to frequent criticism by people and organizations who do not approve of them,—or us. That, no doubt, is your experience also. We live in an age of organizations, and no sooner do we organize a campaign, do something, than someone else is sure to organize another campaign to prevent us from doing it or to make us do something else instead. Therefore, I shall not attempt to tell you of the forms of criticism, opposition, and advice we meet, as this tale would probably be nothing new to you. We in Quebec, however, are not greatly perturbed by those who disapprove of us and those who could show us a better way. We are glad of the results obtained up till now, and hope to obtain still better ones in the future.

Our campaign for the near future is infantile syphilis, which we propose to take up shortly. This question will be studied and taken up at the Congress of the French Speaking Physicians of North America, which will take place in Montreal in September next. In the name of the President of this Congress I am authorized to invite you all to this medical meeting. We expect several delegates from the United States, Europe and South America. Why do not all the physicians of the other Provinces join us in this circumstance? At the last Congress held in Montreal, four years ago, over 600 physicians were present. We expect an attendance of over 1,000 this year. Any physician wishing

to attend this Congress, and those willing to prepare a paper, should communicate with the President, Dr. Albert LeSage, 46 St. Louis Square, Montreal. All papers will be printed and distributed to the members of the Congress; they will also be included in the report of the Congress and again distributed.

We endorse many of the points of view of "L'Union Internationale Contre le Pêril Vénérien", Paris, especially the following:

Typical forms of heredo-syphilis are far from representing the majority of cases. Hereditary syphilis often takes the disguise of another disease.

Each time that the family physician suspects the presence of heredo-syphilis of the first and second generation, his presumption should be confirmed by a clinical, etiological and biological investigation regarding the patient and his family. But his investigation may be negative although heredo-syphilis is really existing.

Observations taken during pregnancy or at the time of the confinement (abortions, premature confinements, hydramnics, relation between the weight of the child and the after birth) furnish information of high value.

In many of these cases a treatment test should be instituted.

Hereditary syphilis must be attended to as soon as it is discovered, and treatment continued during many years. The aim is to obtain not only the disparition of syphilitic accidents but the cure of the disease.

In case of active manifestations, an intensive arsenical treatment is absolutely required. It should be made with progressive doses, keeping in mind the absolute medical contra-indications.

When all clinical and serological symptoms have disappeared, or when syphilis has been constantly latent, a thorough mercurial or bismuthic treatment should be instituted.

In case of defective functions of the endocrine glands, opotherapeutic treatment should be associated with a specific treatment.

It is an imperative duty for the mother who has milk to nurse her child, and in no case should this child be confided to the care of a hired nurse.

Every heredo-syphilitic should continue to be under prolonged medical observation after the termination of his treatment.

As regards preventive treatment of heredo-syphilitic patients, marriage of syphilitics should be explicitly forbidden during the active stages of the infection. The conditions required for the marriage of one or the other sex affected with syphilis are the following:

1. Prolonged treatment of varying duration; shorter, if instituted before a positive Wassermann and followed with the required intensity;

longer, if the patient was already in the positive serological period and had been under an insufficient and badly followed treatment.

2. A period of clinical and serological follow-up of a year, during which time no sign of syphilitic activity has been observed. Reactivation and lumbar puncture shall be the complementary tests.

3. It is always prudent to recommend to the patient intending to marry, a cure during the months preceding marriage.

4. The husband or wife of the syphilitic, who has been authorized to marry, must be submitted to a clinical and serological supervision. If a married man contracts syphilis, he must be intensively and immediately treated, not only in his own interest but also to prevent his wife's infection. The wife must follow a very strict clinical and serological supervision, conception should be deferred, and if pregnancy occurs, she must be attended to during pregnancy, even if she does not show symptoms of syphilis. Even if showing no signs of syphilis, the child, as soon as born, must be treated according to the conclusions of the reports on the treatment of hereditary syphilis of the new-born.

The following resolutions were adopted at a recent conference of "L'Union Internationale Contre le Pêril Vénérien" on heredo-syphilis:

1. That the campaign against syphilis now in force should continue to be supported, that it should be amplified and afforded more important grants.

2. That the technical teaching to practitioners during post-graduate courses and the students' tuition during the course of a compulsory and prolonged term should be directed toward the prophylaxis of acquired syphilis and heredo-syphilis; energetic treatment of the future pregenitors, of the pregnant woman; treatment or prolonged supervision of all who are of syphilitic descent.

3. That lying-in hospitals and organizations of puericulture (prenatal clinics, clinics for nursing mothers and nurslings, maternal homes, etc.) be organized in view of combating hereditary syphilis, either by a close connection with anti-syphilis clinics provided with a serological laboratory or by the adjunction of a special clinic. This maternity clinic being operated with the collaboration of the obstetrician, the syphilologist, and the pediatrician, must secure the uninterrupted supervision and treatment of the mother and children.

4. That the prophylactic education of the public regarding syphilis be energetically carried on in all social centres.

5. That sexual and anti-venereal education be carried on in high schools in such a way that parents and young students may not be offended.

6. That parents, when their children contract marriage, be advised

of the great importance for the future brides and bridegrooms to be examined by a physician in order to find out that no virulent infection exists which could affect the next generations.

Further, the executive of "L'Union Internationale Contre le Péril Vénérien" recommends that in the sanitary examination of emigrants, venereal diseases should be checked up in the same way as all other contagious diseases; that sufferers from venereal diseases should only be allowed to embark on board ship provided there are facilities available for continuation of their treatment while on board; that arrangements should be made with societies entrusted with the reception of immigrants to see that the latter are received under properly prophylactic conditions; that national organizations should continue to carry on prophylactic, sanitary, and moral education; and that other countries should be invited to follow the example of the United States in refusing admission to immigrants suffering from venereal diseases.

May I add, for your interest, some further results of our campaign. After many years of continuous fight against venereal diseases, young men come to our office for certificates of health before contracting marriage. I hope that this will generalize, and that soon young men and young girls will have to present a clean certificate of health before they are allowed to marry.

Another interesting point I will mention is that red light districts in Montreal and other cities of the Province have been done away with. This does not mean that prostitution has been totally suppressed, but it has certainly been lessened.

With Professor Bayet, of Paris, I will say that venereal diseases, syphilis and gonorrhoea, are contagious infections which must gradually be erased from the list of diseases from which humanity suffers. With the means at the disposal of science, such as therapeutic, education, vulgarizing of hygiene, venereal diseases must be vanquished. It is our right, if not our duty, today, to declare that the success of such a program depends in great part, not only on the constant effort, which each nation is willing to accomplish in this new forward movement, but also on the discipline which every responsible individual should impose upon himself, in his own interest as well as in the interest of the human beings among which he is living.

Venereal diseases must be better known to all those who are too often their innocent victims. Individual liberty must indeed continue to be the most beautiful and noble ideal for each right-thinking individual, but this liberty badly cultivated, and consequently wrongly utilized, must not be for our fellow creatures the determinant cause of their physical or moral decadence.

By sterilizing germ carriers, we now have at our disposal sure therapeutic means to lessen the contagiousness of this infection, which, directly or indirectly, but always seriously, injures the home. It is therefore in the name of the conservation of the home, which, for all nations, is the indispensable element of happiness and prosperity, that in gathering all energies we must try to suppress venereal diseases.

In closing, I might venture to suppose that you too, my friends, like ourselves, are ever overcome by the sense of the thanklessness and perhaps the futility of our task. Those whom we serve the best, for whom we are doing the most, are those who shudder at the mention of the work we are doing, who think it polite never to have heard of the things we teach. But, at least, we have the consolation of knowing that the greatest of public services were rendered by men who on that account were "despised and rejected of men".

I am reminded of the reply of a sanitary fatigue man in a military dysentery hospital in France, a big Highlander, wounded, incapacitated, and assigned to this unpleasant duty for the remainder of his war services: "Darrty hands", he said, "but a clean herrrt".

Our work may be such that nice people sometimes think we have dirty hands, but it leaves us very clean hearts, and the satisfaction of having done for the rest of humanity a great service which the rest of humanity had not the courage to do for themselves.

Upon the whole I think I may say, with the experience of many years of observation, that I remain more and more convinced that the campaign against venereal diseases will continue to give the best of results only through the increasing diffusion among the people of knowledge of the terrible consequences of this world-wide scourge. It is only through the most intensive educational campaign that we will be able to keep open the public mind. By public mind, I mean the whole population: those who are infected and those who must guard themselves against the dangers of contagion. We must, of course, give to those infected the means to be treated and cured. As to the others, who are the greatest number, we must convince them of the necessity to unite their efforts to combat in a practical and effective way venereal diseases. They can do it: either through donations, or else through facilitating the penetration into their midst of the means which science offers to fight these diseases. But in the first, as in the second case, it all amounts to a question of education; the rest is only the practical results and the immediate application of the knowledge gathered through education. This is what we have tried to accomplish in the Province of Quebec, and today I can say that we have succeeded in a most encouraging way, as you may have been able to note.

Neo-Natal Mortality

By DR. HELEN MACMURCHY,
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THIS name was coined by the late Prof. J. W. Ballantyne, of the Royal Maternity Hospital of Edinburgh, probably in a Clinical Lecture delivered there in 1900, entitled "A Plea For A Pre-Maternity Hospital". A paper on the same subject from his pen appeared in the *British Medical Journal* of April 6th, 1901, and a friend who read it gave him £1,000 to found a Pre-Maternity bed in the Hospital, which was called the Hamilton bed.

The idea of pre-natal care gradually won its way. In 1913, Prof. Amand Routh said that it was the best way to meet the case. In 1914, when Prof. Ballantyne's book "Expectant Motherhood" appeared, there was a Pre-Maternity Ward of four beds in the Edinburgh Royal Maternity Hospital.

The humanity, learning, skill and kindness of the author adorn every page. Admission to the Pre-Maternity Ward should be simple, he says. "It is enough that the patient is pregnant, and that she is ill". He would "stretch a point" and admit those who are without proper food and have no home comforts—he would protect and shelter there those who are ill and are alone and deserted in their motherhood, and he says there should be a garden and opportunity for sewing and other work.

In 1920 and 1921 favourable reports began to appear in British and Foreign Medical Journals as to the value of early and efficient anti-syphilitic treatment of the expectant mother who was suffering from this disease. This, one of the most brilliant accomplishments of the profession in the prevention of Neo-Natal Mortality, was foreshadowed in Dr. Ballantyne's book, in which at pages 257-8 he speaks of ante-natal therapeutics in this direction, and adds:—"These experiments have given me certain post hoc successes, so to say; but one must necessarily be very careful to refrain from calling them propter hoc results until much more information has been accumulated on the subject".

Perhaps a brief reference to the development of this work may be permitted here. It is well known that in London, Paris, Baltimore and elsewhere, in special wards and clinics, many expectant mothers with positive Wasserman reactions, placed under proper treatment, instead

of having pregnancy terminate by the birth of a dead or diseased child, have borne a child alive and well. An account of the literature of this subject was given in Abstract No. 2, published by the Department of Health of Canada in 1922. It is to be wished that the profession in Canada would oftener publish their own results in this and other obstetrical work. With the exception of a reference in Dr. Cosbie's excellent article on "The Obstetrical Causes and Prevention of Still Birth and Early Infant Mortality", in the Canadian Medical Association Journal of December, 1923, and the work of Dr. Gordon Gallie at the Toronto General Hospital, also a paper on "Maternal Mortality", by Professor W. B. Hendry, appearing in the same Journal in April, 1923, it has been difficult to find further information.

At the meeting of the British Medical Association in July, 1922, Dr. Ballantyne gave the results in the Venereal Disease Department of the Edinburgh Royal Maternity Hospital. The total number of mothers suffering from Venereal Disease was 171. The total number of still births was 27, or 157.8 per 1,000. The rate of still births per 1,000 for the mothers who received ante-natal obstetrical care and anti-syphilitic treatment was 50.7 per 1,000. Among those who did not receive such care and treatment, it was 606 per 1,000.

Strictly speaking, neo-natal mortality refers to the first month after birth. But, as the author of the term says:—"The cause of early neo-natal deaths will include all these already in action in ante-natal and intra-natal life; to those will fall to be added those which become effective after birth, . . . from the new and less protecting environment or from the ignorance and folly of the persons into whose hands the new life is committed".

By far the most valuable source of information on Neo-Natal Mortality in the ante-natal and intra-natal group is Report No. 7 of the Ministry of Health, London, England, by Dr. Eardley Holland, on "The Causation of Foetal Death", published in 1922. The investigation occupied a period of seven years—1914 to 1921. Three hundred cases of foetal death were thoroughly investigated, including 167 which occurred at or near the time of birth. The primary causes were as follows:—

The complications of labour	51	per cent.
Syphilis	16	" "
Toxaemias of pregnancy	10	" "
Unknown causes	10	" "
Placental causes	6	" "
Foetal causes	5	" "
Maternal Diseases	2	" "

Few of us thought that the first would be so large, or the second so small. Never before have we had a scientific investigation on an adequate scale. Eighty-one of the 167 bodies at post-mortem showed subdural cerebral haemorrhage or laceration of the tentorium cerebelli, and all but 6 of these showed both.

The meaning is plain. Obstetrics and the teaching and practice of Obstetrics can and should be improved. Obstetric instruments have saved many lives. How many have they destroyed?

It does not do to rely on our general impressions. We used to think that syphilis was the cause of about 50% of still-births or more. *No.* 16 per cent.

Dr. Holland shows that his results prove that:

52 per cent. of these lives might have been saved—

20 per cent. by better ante-natal care,

20 per cent. by better intra-natal care,

12 per cent. by both together.

Dr. Gordon Gallie of Toronto and others have arrived at a similar conclusion in their work.

What is our Neo-natal loss? It is generally agreed that still births (after the 28th week) are 30 per 1,000 births and that miscarriages are four times as many. That is 1,150 pregnancies give 1,000 living births. So that in 1900 or thereabouts, when Infant Mortality, even in England, was 153, Dr. Amand Routh was doubtless right in saying that our pre-natal loss was equal to our Infant Mortality.

What of the remaining part of our Neo-natal loss, viz.:—Deaths in the first month.

Infant Mortality in England in 1850 was 152

“ “ “ “ “ 1900 “ 153

“ “ “ “ “ now is about 75

and in some parts of Canada now our Infant Mortality is about 75. This is encouraging. But two facts lie concealed beneath these figures.

1. Half of that Infant Mortality, at these earlier periods, was in the first month of life—Neo-natal. 2. And it is the same today. Infant Mortality under one month has never been reduced. Even in New Zealand, the same thing is true, as shown by a diagram in the Annual Report for 1923 of the Director of Child Welfare for the Dominion of New Zealand.

Few of us realize that half of our Infant Mortality occurs in the first month of life. It is well expressed by the Statistician to the U.S. Children's Bureau, Robert Morse Woodbury, Ph.D., in "Causal Factors

in Infant Mortality", Bureau Publication No. 142, when he says, referring to the records of 23,000 Infant deaths occurring in eight American cities:—"If the Infant Mortality rate for the first two weeks of life were continued to the end of the first year, nearly all the children would die, and if the Infant Mortality rate for the first month continued to the end of the twelfth month, over half of the children would die".

What else has remained about the same since 1900? Maternal Mortality.

The one fact explains the other. What should we do? Take better care of the mother—Ante-natally, Intra-natally and Post-natally—till she has regained her strength, and Neo-Natal Mortality will grow less and less until we reach the irreducible minimum. For every thousand living births in Canada in 1924 we paid a ransom of five mothers' lives. In New Zealand it was the same. In the registration area of the United States it is no better. In England and Wales it is better—about 3.9 instead of five. But many general practitioners in Canada have attended one thousand or even two thousand births and never lost a mother. Mothers should not die in childbirth.

In 1924 in Canada we lost 1,270 mothers in Childbirth, which is 24 every week.

It is a loss which we can ill afford, and nearly all of these lives could be saved.

Neo-Natal Mortality may be greatly reduced, by the education of the profession, the public, and, above all, *the Mother herself*.

Of all the branches of Preventive Medicine and Health work, there is none more important than Preventive Obstetrics. The medical student should know that it is the most important of all his studies for his own success in practice, for the preservation of his patients' lives, and for the good of his country. Ante-natal methods are his strategy, intra-natal methods are his tactics, in this war against Death.

The Health Organization of the League of Nations issued in 1925 a Memorandum on Still Births which is important to us all, and which it is hoped may lead to uniformity in dealing with this matter among the nations of the world. This will help to educate the public and the profession.

The new knowledge and the new spirit of the past ten years have revolutionized our care of the mother and child. No longer do we doubt that Maternal Mortality and Infant Mortality, including Neo-Natal Mortality, are to a large extent preventible. If anyone still remains in doubt, let him consider the fact that the number of Still

Births varies greatly in different parts of the same country in the same year,

Dr. F. Watts Eden, of Charing Cross Hospital, in an article entitled "The Case For The Unborn Child", appearing in the *Lancet* of December 12th, 1925, shows that whereas one-third of the births occurring in the Hospital of an Industrial District were premature, in two other hospitals in non-industrial districts only 10% and 12% respectively were premature. This shows the wisdom of the Maternity Convention passed at the International Labour Conference at Washington, in 1919, since recommended and authorized in different countries, though in 1924 only Greece, Spain, Roumania and Bulgaria had deposited their formal ratification of it with the Secretary-General of the League of Nations.

It also reminds us that one cause of Maternal Mortality and Neo-Natal Mortality is that the expectant mother works too hard at this important period of her life. Often she has to.

In the words of Dr. Haig Ferguson—"The advantages of ante-natal care cannot be overestimated."

1. This is the first and greatest of all ways to prevent Neo-Natal Mortality. As Dr. Harper of Sydney, Australia, says:—"To save infants' lives, improve the health of the mother". This includes the notification of pregnancy by some suitable means and the education of the mother.

2. The second way is closely connected with it—the education of the profession. *Better Obstetrics*—A great subject. Think of the modern work on Toxaemias of pregnancy alone. This includes the care of the baby. Dr. Francis J. Browne, Pathologist to the Edinburgh Royal Maternity Hospital, in a series of 153 Neo-natal deaths found 48 of these were caused by pneumonia. A common cause of that pneumonia is probably that some one who had what people call a "cold" was too close to the baby. Beware infections of the new-born. Do we always remember to see that the air passages are clear after birth? Wards for premature babies, where they are sedulously and scientifically cared for, prevent many neo-natal deaths. If you can keep them alive *a few days*—they often live.

Professor W. B. Hendry has called special attention to another most important point. He finds that in the "starvation treatment" of the toxaemias of pregnancy it goes hard with the baby. Often its life is sacrificed—perhaps not just in the first month, but very soon. He and his colleagues in the Burnside Hospital have suggested that the expectant mother should be on a salt-free diet for one week in each month towards the end of pregnancy. One looks forward with great interest to further reports of this treatment.

3. The Education of the Public. We have not got very far with it—perhaps not even as far as we think. We must keep on and on and on. Reference has been made to the kind and humane spirit of Dr. Ballantyne. He lived to see his work prosper. In his last communication, already referred to, he remarked: "This subject is no longer regarded as a wild dream of futurity". There is an interesting reference to him in a recent biography—"The Life of Dr. Alexander Whyte". Dr. Ballantyne was one of Dr. Whyte's elders in Free St. George's Church, Edinburgh.

Perhaps the education of the mother and the profession and the public is more greatly advanced by the life and work of a physician like Dr. Ballantyne than by any other power whatever. Such a life reminds one of the description of Dr. Case's door by Sir William Osler—that well-worn door to which the whole countryside came and knocked—now to be seen in the museum at Dundurn Park in the City of Hamilton. Think of the procession, stretching almost through three generations, which came to that door.

It makes all the difference to have the kind of doctor and the kind of nurse that the mother is willing to confide in and to listen to. They are the real motive power of the movement, which has as its object the prevention of maternal and infant mortality; and the share of the nurse, particularly in ante-natal care, is not only great and important but indispensable.

CANADA
(Registration Area)
Neo-Natal Mortality

	1924	1923	1922	1921
Total still births	5,582	5,653	5,804	6,387
Total births (exclusive of still births)	157,595	156,897	164,194	168,979
Total deaths under one year	12,375	13,822	14,256	14,893
Total deaths under one month of age	6,551	6,975	7,205	7,333
Total deaths one month and under two months of age	1,044	1,263	1,184	1,291

CANADA

Year	MATERNAL MORTALITY		1,000 ths	INFANT MORTALITY	
	Total No. of deaths	Rate per Living Bir		Total No. of deaths	Rate per 1,000 Living Births
1921	1206	4.7		26,280	102.0
1922	1248	4.9		25,553	101.2
1923	1175	4.9		24,833	103.3
1924	1270	5.2		22,709	92.9

Rabies in Ontario

C. M. ANDERSON, M.D., C.F.H.,
Director of Laboratories, Department of Health of Ontario.

RABIES is one of the few ancient and widespread disorders which was recorded before the advent of the Christian era. So much has been written about this disease in the past ten years that nothing further would appear necessary. The Department of Health, however, has recently been in receipt of a number of letters from physicians and the public, asking for advice as to the proper course to pursue when persons have been bitten by dogs possibly infected with rabies. It would therefore appear timely to publish a short article on the prevention and control of rabies.

Rabies occurs from Greenland to the Philippine Islands, in every country where quarantine on dogs entering the country has not been practised. England and Australia have been practically free from the disease, owing to strict law enforcement of holding all dogs brought into the country for two months' observation. It occurs in nearly every State in the United States, but is more prevalent in the Eastern States.

For the three years previous to January of this year, the Province of Ontario had been entirely free of rabies infection among animals. During the Fall of 1925, a party of American hunters brought a number of dogs into the Gatineau region north of the City of Ottawa to hunt deer. One of these dogs shortly afterwards developed rabies, left the party and disseminated the infection from the Gatineau Valley, southward through the Province of Ontario to the St. Lawrence River. Since that time, our records show that other dogs imported from the United States into the province have developed rabies shortly after their arrival in this province. We now have infected regions around Windsor, Niagara Falls and in the Eastern section of the province.

Had a quarantine system been established in Canada at this time similar to the ones in effect in Great Britain and Australia, we would in all probability have continued to enjoy the freedom from this disorder which we had enjoyed for three or four years.

The following table shows the places from which heads of animals have been received up to August 31, 1926, of this year, and the laboratory findings:—

<i>Date Received</i>	<i>Place</i>	<i>Species</i>	<i>Result</i>
Jan. 27th	Kemptville	Dog	Presence of Negri bodies
Jan. 27th	Kemptville	Dog	Presence of Negri bodies
Jan. 30th	Kemptville	Horse	Absence of Negri bodies
Feb. 2nd	Pakenham	Dog	Absence of Negri bodies
Feb. 8th	North Gower	Dog	Presence of Negri bodies
Feb. 10th	Windsor	Dog	Absence of Negri bodies
Feb. 16th	Toronto	Dog	Absence of Negri bodies
March 1st	Huntsville	Dog	Absence of Negri bodies
March 20th	Kinburn	Dog	Absence of Negri bodies
March 22nd	Enniskillen	Dog	Absence of Negri bodies
April 13th	Tottenham	Dog	Absence of Negri bodies
June 1st	Morrisburg	Dog	Presence of Negri bodies
June 15th	Hagersville	Dog	Presence of Negri bodies
June 28th	Roslin	Dog	Absence of Negri bodies
July 9th	Harrow	Dog	Presence of Negri bodies
July 13th	Essex	Dog	Suspicious (Brain undergoing putrefaction)
July 26th	Amherstburg	Cow	Presence of Negri bodies
July 26th	Niagara Falls	Dog	Presence of Negri bodies
Aug. 10th	Harrow	Dog	Presence of Negri bodies
Aug. 10th	Niagara Falls	Horse	Presence of Negri bodies
Aug. 10th	Kemptville	Dog	Presence of Negri bodies
Aug. 10th	Embryo	Dog	Absence of Negri bodies

Now that we have rabies with us, what is the proper course to pursue? Most important of all, is the co-operation of the public. All dogs in these infected areas should be effectively muzzled. By effective muzzling, we mean an attachment that will positively prevent the dog from biting another animal. All ownerless or stray dogs in these areas should be promptly destroyed. So effective is the muzzling of dogs that it has been said that if all dogs were muzzled for a period of one year, rabies would be a disease which only history could describe.

THE DISEASE IN ANIMALS

It is important to remember that all warm blooded animals are susceptible to rabies infection. The dog, however, has undoubtedly been responsible for perpetuation of the disease throughout the centuries. Rabies does not develop spontaneously in any animal. It is not caused by hot weather conditions as many suppose, nor by extreme thirst. It is a communicable disease in exactly the same sense that smallpox, scarlet fever and measles are communicable. In order for any animal to develop rabies, it must have been bitten sometime within the previous six months by another animal suffering from the disease. The wound caused by the bite will, as a rule, have been completely healed by the time the disease develops.

The disease usually takes either of two types, the furious or excited type, or the dumb paralytic type. Occasionally the disease will show a combination of these types; many animals exhibiting furious symptoms only when disturbed. One of the earliest symptoms shown by dogs is a sudden change in disposition. Many friendly and faithful animals turn first on their master. Another common symptom is a desire to wander. The dog becomes restless and excitable. During the first few hours after the onset, the dog may be unduly playful and over-friendly. Some fatal infections to man have occurred at this stage. As the disease progresses, the animal is easily startled and growls and barks on slight provocation. The growl or bark is changed in tone to a hoarse howl, followed by an unequal series of barks lower in pitch than is normal. Another common early symptom is the inability to completely close the jaws. It is not uncommon for persons to be bitten at this time in examining the dog as to the possibility of a bone being stuck in his throat. As the course of the diseases progresses, the animal becomes increasingly more restless and irritable until the stage of depression is reached. Swallowing is difficult at any stage, and later in the disease, impossible. Convulsions of greater or less degree now occur, and the animal may die in one of these spasms. More frequently, however, a paralytic stage supervenes, the hind legs usually being paralyzed. The dog drags himself to a secluded place. The jaw drops from paralysis and its muscles become progressively emaciated. The animal dies when the paralysis ascends to the centres controlling respiration. The paralytic form is very frequently seen in herbivorous animals, but horses frequently show the furious type in its most agonizing form.

CAUSE OF THE DISEASE

While it has been known since the time of Celsus in the first century that rabies was transmitted by the bite of one animal to another, it was not until Negri in 1903 described certain bodies (Negri bodies), seen by him in large nerve cells in sections of the brain, that anything was found which could be proven absolutely specific for rabies. Typical Negri bodies are not found in any condition other than rabies. These bodies are considered by certain observers to be of a protozoan nature. The organism is very pleomorphic, as in one stage of its existence it is so small that it will pass through the pores of a Berkfeld filter which will ordinarily hold back the most minute bacteria.

PREVENTION OF RABIES IN MAN

Statistical records show that the incubation period in humans varies from two weeks to ninety days, depending upon the location of the

bite and the amount of virus introduced into the body. In general, bites about the head have a shorter incubation period than bites upon the body or extremities. On account of the relatively short incubation period in bites about the face, it is advisable to begin Pasteur treatment immediately in such cases if there is any possibility of the dog having rabies. In other cases, particularly in those bitten through the clothing, it is usually sufficient to secure the dog inflicting the wound for a period of ten days, during which time, if the animal is suffering from rabies, it will develop characteristic signs and symptoms of the disease which will terminate in death of the animal. If the animal dies during this period, the head should be severed from the body and sent to the Laboratories of the Department of Health, packed in ice. The Department will then be able to advise the sender whether sections of the brain show the characteristic appearance of rabies infection. Persons bitten by animals proven such a way to have died of rabies should receive the Pasteur treatment at once. Usually not more than five days will be necessary to indicate to the person bitten whether the animal was suffering from rabies. If the dog does not die during the ten days observation period, the patient may be assured that he was not bitten by a "mad dog", and Pasteur treatment would therefore be unnecessary.

When an animal is killed shortly after biting someone and the head sent to the laboratories, it is not always possible to demonstrate Negri bodies, even in animals actually suffering from the disease, on account of the fact that during the early stages the virus is not developed sufficiently in the nerve cells to be observed by means of the microscope. In such cases, the onus must rest with the person sending the head as to whether the animal was suffering from rabies, as indicated by the symptoms shown by the animal previous to its death. We therefore strongly advise against the killing of the animal. However, in dogs acting strangely in a known infected area, and also known not to have bitten anybody, it would be quite justifiable to destroy such animals, rather than risk their getting away at a later period and transmitting the disease to other animals. The necessity for sending in the whole uninjured head of the animal, packed in ice, cannot be too strongly emphasized. Each year we receive a number of heads from animals shot through the brain. In some cases the only area of the brain that can be definitely identified is the cerebellum, the cerebrum being almost completely removed in despatching the animal. Decomposed brains are also difficult to examine, as the decomposition products formed prevent the characteristic staining of Negri bodies.

IMMEDIATE TREATMENT OF THE WOUND

Disinfectants commonly used in first aid treatment to wounds, such as tincture of iodine and hydrogen peroxide, are not effective in sterilizing wounds caused by the bite of a rabid animal. This was learned many centuries ago when the actual cautery came into use for this purpose.

Pure nitric or carbolic acid are now recognized as the best disinfectants to apply to wounds. If either one of these is applied immediately after the bite has been inflicted it will destroy most of the virus introduced into the wound and should serve to lengthen the period of incubation and safely allow time, except in bites about the face, to observe the animal before beginning the Pasteur treatment.

Pasteur treatment consists of an injection of attenuated virus every day for twenty-one days. This treatment is supplied free of charge to any physician in the Province of Ontario. When treatment is required the physician should wire or write the Department, depending upon the urgency of the case, giving the following information:—

1. Name of patient.
2. Age of patient.
3. Location of bite.
4. Date bitten.
5. Whether the animal causing the bite has been secured.

A copy of the direction sheet for the administration of the rabies vaccine, distributed by the Department of Health of Ontario, is appended at the end of this article.

PROPHYLACTIC VACCINATION OF DOGS AGAINST RABIES

On account of the increasing prevalence of rabies in Japan and the apparent failure of enforcement of quarantine and muzzling regulations, the prophylactic inoculation of a large number of dogs with a single dose treatment was attempted. Umeno and Doi, having thus inoculated over 30,000 dogs, found only 2 cases of rabies during the following year in this group, whilst in the uninoculated animals the disease was very prevalent. Hata, another Japanese observer, reported that only 41 dogs of 104,629 which had been vaccinated developed rabies, whilst 1,699 of the unvaccinated group of animals contracted the disease. In America, Eichorn and Lyon, of the Bureau of Animal Industry, have recorded observations of successful attempts to control rabies by means of prophylactic inoculation.

CONCLUSIONS

Compared with the greater scourges such as smallpox, plague, diphtheria, etc., rabies has played a minor role in the mortality of the human race, but it has continued to claim its victims annually throughout the centuries, even to the present day. It has, however, entailed a very significant monetary loss from the death of valuable domestic animals. The disease in man when it develops is of such a horrifying and hopeless nature that it is naturally dreaded by all.

Since it has been conclusively demonstrated by comparatively simple measures that the disease could be wholly eradicated, the continued existence, not to mention its increase, is a reproach upon the efficiency of organized society. The continued presence of this dread disease is in no small measure contributed to by persons who are skeptical concerning, or even deny the existence of, rabies as a definite disease. Such persons indeed must have little faith in human nature, either to regard those investigators who have devoted years of study to the subject as being either untruthful or entirely on the wrong track. The various cults, some of these controlling daily newspapers, continue to foster this distrust for honest scientific workers, right at the present time. This might be excusable in the seventeenth century, but it is difficult to understand at the present time. If the organisms causing disease were the size of caterpillars, one would consider the mentality of persons disbelieving in their existence as being truly defective. The fact that organisms causing disease are so small that they require to be magnified from 500 to 1000 times before the human eye can see them naturally limits the persons observing them to a very few in a community. A visit to any organized laboratory should be the means of dispelling any doubt as to the existence of these lower forms of life, and we invite any persons doubting the existence of rabies as a definite disease to visit our laboratories, where we shall be pleased to demonstrate the Negri bodies which are characteristic of the disease.

If the whole-hearted co-operation of the public is obtained, rabies can be effectively controlled, otherwise, we may look for a spread of this disorder.

ADMINISTRATION OF RABIES VACCINE (PASTEUR PREVENTIVE TREATMENT)

Rabies Vaccine was introduced by Pasteur, in 1884, as a preventive against rabies (hydrophobia), and treatment with this vaccine is thus frequently spoken of as the Pasteur Preventive Treatment. This treatment consists of 21 injections of rabies vaccine, one injection each day

for 21 successive days. Immunity does not fully develop until from one to two weeks after the last injection of the series.

The virus of rabies implanted in a wound by the bite of a mad dog passes slowly to the brain by way of the nerves, and from 20 to 60 days are required for the development of the disease, in man, following such a bite. It is because of this long incubation period that active immunization with rabies vaccine is possible. In other words, a patient usually has time in which to develop an immunity against rabies before the end of the incubation period of the disease. Whenever treatment is deemed advisable, however, it is most essential that no unnecessary time be lost in commencing it. It is recommended that the following persons be treated:

Persons bitten by animals which have been proven rabid either by clinical symptoms or by microscopic examination of the brain.

Persons whose hands or face have been contaminated with saliva of a rabid animal without being bitten. This is because of the presence of cracks, hangnails or other small open wounds.

Persons bitten by stray dogs, when it proves impossible to locate the dog for observation and diagnosis.

Persons bitten, pending laboratory diagnosis on the brain of the biting animal, provided that the symptoms or actions of the animal were suspicious.

PREPARATION OF RABIES VACCINE AND NATURE OF THE PASTEUR PREVENTIVE TREATMENT

Pasteur showed that the virus of rabies obtained from a mad dog became increasingly virulent for rabbits when it was transferred from one rabbit to another in a long series of experimental inoculations. This was evidenced by the fact that, as a result of the procedure indicated, the incubation period of rabies in the rabbits used became shortened to 7 days. Virus that has been treated as described above is spoken of as "fixed virus" and is used for the inoculation of rabbits in the preparation of rabies vaccine. This "fixed virus" is markedly virulent for rabbits, but is much less virulent for man. Pasteur further modified "fixed virus" by drying it in jars containing caustic soda, and showed that virus so dried for a certain number of days loses its virulence entirely.

The Pasteur Preventive Treatment consists of the injection of dead virus followed rapidly by living virus.

DOSE OF VACCINE

Each vial or syringe contains the proper dose of vaccine for the day of treatment denoted thereon. The daily dose varies from 1 to 6 c.c.'s. *For the first three days the dose is large and is therefore supplied in two containers in order that it may be given in two separate injections one immediately following the other.* The remaining eighteen doses are small and should each be given in one injection.

METHOD OF INJECTION

Rabies Vaccine is distributed either in syringe containers or in vial containers. When in vials, any sterile glass syringe may be used for making injections.

After preliminary cleansing of the skin, each injection is made into the *subcutaneous* tissue of the abdomen, different sites being selected for successive injections. No after-dressing is necessary. It is suggested that the first day's injections be made just below the margin of the ribs, one injection being made on each side of the middle line of the abdomen. The second day's injections may then be placed below the first day's injections, and the third day's below the second day's. The subsequent doses should be injected wherever injections can be most conveniently made in the abdominal wall.

In view of the nature of rabies vaccine—a living virus—special care should be taken by the physician in making injections.

REACTIONS

Injections of rabies vaccine ordinarily produce local areas of redness which vary in size in different individuals. The severity of reactions depends upon the virulence of the virus injected, and therefore varies from day to day in accordance with the required daily variations in the virulence of the virus which is used in the complete treatment. Reactions do not become so severe as to interfere with the activities of patients, however, for there is seldom any general reaction, and complaint is usually made of tenderness and soreness only.

It should be borne in mind that although hundreds of Pasteur treatments are given yearly with the most satisfactory results and without any attendant ill-effects, a few cases of an indefinite type of paralysis have been recorded. These have been thought to be associated with the treatment and have occurred very rarely—in about 1 of 2,500 treated cases. This paralysis affects adults, chiefly, and no cases of it have been recorded in young children. It is believed that during the past

15 years, no case of paralysis associated with the Pasteur treatment has developed in Canada, and that no other complications of any kind have arisen; yet the slight risk of paralysis should be explained to such patients as are inclined to insist on being given rabies vaccine unnecessarily, *i.e.*, in the absence of clinical or laboratory evidence that the biting animal was rabid.

In order that reactions from the use of rabies vaccine may be minimized, exposure to cold (cold baths, etc.) and excesses of any kind should be carefully avoided during the course of treatment.

NOTES

Rabies Vaccine must be kept on ice. Since this vaccine must be used while fresh to be effective, each complete 21-day treatment has to be forwarded in several shipments.

Do not use Rabies Vaccine after the date marked on its wrapper.

Should the contents of any container of Rabies Vaccine happen to appear unsatisfactory in any way, or should a container arrive at its destination broken, or should injections be interrupted for any reason, the Connaught Laboratories should be notified at once.

A record of administration of vaccine is included with the first shipment of each Pasteur treatment distributed by the Connaught Laboratories. It is requested that this record be filled in daily, and that it be returned to the Laboratories just as soon as the treatment is completed.

Health Teaching in Rural Schools

By JEAN E. BROWNE,
President, Canadian Nurses' Association.

THE topic which has been assigned to me by the program committee is in itself significant of the trend of modern public health opinion. Some years ago, we spoke only in terms of Medical Inspection of Schools, confined mostly to the large cities.

The idea of health teaching has gradually been evolved from the old idea of mere inspection for defects. Health Education necessarily includes the inspection of school children for physical defects, and plans for the correction of remediable defects, but its chief aim is the prevention of these defects. At the present day, we feel the obligation of extending health teaching to all Canadian children, rural as well as urban.

Before attempting to discuss the principles and methods of health teaching, it must be pointed out that it is folly to attempt to teach health in a school that breaks all the laws of Hygiene. So, as an essential background to successful teaching of health, the school room should be clean, it should be properly illuminated, it should have adjustable desks and seats properly adjusted to the size of the pupil, it should have good and sanitary facilities for washing and drying the hands, it should have plenty of good drinking water supplied in a sanitary way to the pupils; rural schools should have a jacketed stove or furnace with provision for proper ventilation, and above all, indoor sanitary toilets.

The only reason we have for teaching the facts of health in any school is for the purpose of establishing habits of personal hygiene in the pupils. Hygiene has been on the course of study in the elementary schools of this country for a great many years, but until recently it was unfortunate that the academic knowledge of the facts had very little relation to their practice by the children. The objective of health teaching to-day is to present to children the simple facts of health on which healthy living is based, and to provide them with a powerful motive which will create in them a desire to put these facts into practice.

The practical questions which must be answered at this point are:—Who is to teach health in the rural schools, and what should be taught?

In my opinion, health teaching in all schools rightly devolves on the

class room teacher, but in rural schools this is a necessity, for there is no one else to do it. No teacher can assume this important responsibility, however, without adequate training, so that our starting point is in the Normal Schools of Canada.

A mere course of study in hygiene during the Normal School period is not sufficient. There must be a program which will make it possible for the teacher-in-training to absorb into her inner consciousness a realization of her mission in the conservation of the health of her pupils, and she herself must attain as nearly as possible to physical perfection before she commences this mission.

This training cannot be given in a haphazard way by a desultory course of lectures by a member of the Normal School staff who is taking some other major subject, nor can it be given successfully, in my opinion, by any one who is not a full-time member of the staff, or by any one who has not had considerable experience as a teacher, and who is not thoroughly conversant with the problems of rural schools. In 1918, the Department of Education in Saskatchewan started an experiment, which has proved to be most successful, by appointing to the staff of each of the provincial Normal Schools a school nurse who had had experience in health work in rural schools, and who had been, previous to her nurses' training, a successful teacher.

One of the most important aspects of the training of teachers in health education is the consideration of their own personal health problems. First of all, each student should be examined for deviations from the normal in exactly the same way as the children in the elementary and high schools are examined. The Normal School Nurse urges those who have defects to lose no time in getting them corrected. She is able to point out to the student the benefits of this procedure, and to assist him in making the necessary appointments. Sometimes, in fact, frequently it is found that the students are financially unable to secure treatment. An arrangement has been made in Saskatchewan between the Normal Schools and the Red Cross Society, whereby the Red Cross Society advances the necessary funds in such cases, and the students give their promissory notes, which are redeemed as soon as possible after they commence teaching.

But besides the problem of remediable defects, Normal School students frequently have pressing problems connected with their boarding houses, and the fatigue and nervousness incidental to a heavy year's course. In all such matters, they find a sympathetic consultant in their health teacher. It must be remembered that many of these teachers-in-training are scarcely more than children themselves.

The course itself has to be very carefully planned in order to avoid wasting time in teaching which will bring little or no returns. When all our schools, both elementary and secondary, are giving rational instruction in health, it will not be necessary to teach the elements of personal hygiene and physiology in Normal Schools. Unfortunately, this is necessary to-day, and, in the one year course, most of the time allotted in the first term should be devoted to these subjects. During the second term, the lectures should deal with all the practical and pressing problems of rural schools, such as:—

- I. Ventilation—of homes; of schools.
- II. Pure Water Supply:
 - (a) Various sources of water supply in the province.
 - (b) Prevention of pollution of surface wells and springs.
 - (c) Conservation of rain water.
- III. Clean Milk.
- IV. The Posture of School Children.
- V. Hygienic teaching and the teaching of Hygiene.
- VI. Maintenance of hygienic conditions in the school.
- VII. Detection and correction in physical defects in pupils.
- VIII. Detection of cases of contagious and parasitic diseases.
- IX. Indications of health disorders in children for which parents should keep children at home and notify the school.
- X. Diet for school children.
- XI. (a) The formation of good health habits among children.
(b) The breaking of wrong health habits.
- XII. School Accidents: Fainting, nose-bleed, wounds, frost-bites, burns, scalds, sprains, dislocations, fractures, hemorrhages, swallowing a pin, foreign body in the eye, foreign body in the ear, foreign body in the nose, epileptic seizures, etc.
- XIII. Demonstrations in Home Nursing.

While it is impossible in an address of this kind to elaborate on any of the headings given above, the heading "The Maintenance of Hygienic Conditions in the School" must receive special mention.

It is simply deplorable to see the evil effects on posture induced in so many of our Canadian youth by improper desks and seats in the elementary schools. Quite recently I visited some splendidly equipped town schools, in two of which all the desks and seats were of the best modern, adjustable type. In spite of this, I found at least 50 per cent. of the children sitting with their shoulders hunched up at desks which were several inches too high for them. The adjusting with a monkey-wrench would have taken less than half an hour for the whole

room, if the teacher had only known how—but she didn't, and the same lack of knowledge is displayed in thousands of class rooms in this country to the great detriment of the children. In other rural schools which I have visited recently, I saw the old stationary double desks and seats, bad enough under the best of conditions, but with a space between the desk and seat—in some cases several inches—it meant that the pupils had to bend from the waist while working at their desks. If the teacher had only known that the desk should overlap the seat by two inches, what discomfort, and indeed pain, might have been saved for these children, to say nothing of the stooping posture that is bound to result from such habitual bending. Some years ago, I entered a primary room in which there were 33 children, and not one of them could rest his feet squarely on the floor. One little tot had her chin on a level with her desk, and yet she was expected to do written work. This condition amounted to torture of helpless children. The teacher was remorseful when she realized what it meant, but no one had ever told her anything about the significance of desks and seats.

Even in this limited course, teachers can be taught to detect the symptoms of such commonly occurring defects as malnutrition, enlarged and diseased tonsils and adenoids, decaying teeth, chorea, goitre, incipient tuberculosis, defective vision, defective hearing, trachoma, orthopedic defects and of the communicable diseases commonly occurring among school children. Have you ever seen the poor little skeleton of a child in school, who, in addition to wrong diet and lack of sleep, probably is found, on examination, to have enlarged, diseased tonsils and a mouth full of decaying teeth? Happy the teacher who knows the significance of all these things, and is able to advise the parents of the child. The diet can, of course, be supplemented by the nourishing hot school lunch. Many just such children in the schools of Canada are becoming the victims of tuberculosis, because nobody in contact with the child has even an elementary knowledge of health.

The most important work of the teacher in connection with her health programme is the teaching of personal hygiene. She has been made to realize in her Normal School course the significance of all the simple but tremendously important health habits—such as those in connection with diet, ventilation, personal cleanliness, sleep, exercise, posture, holding a handkerchief over the mouth and nose when coughing and sneezing and how to avoid passing disease germs on to other people.

At this point, the inquiry naturally arises as to the principles and methods of teaching these simple facts of health. There are no special principles relating to the teaching of health. The teaching of health

must conform to the essential principles underlying all real teaching. In Herbert Spencer's words,—“The vital principle is to enable the pupil rightly to instruct himself.” The child can only learn by his own experiences. Another great principle of education has to do with habit formation, and we know that the period of easy habit formation is during the impressionable years that the child spends in our elementary schools. If we keep these two great principles of education in mind, we can't go very far astray in our methods.

Any method which we may use should be checked up by the question,—“Does it create a pleasurable excitement in the pupil?”—for a child's intellectual instincts are always trustworthy. Everyone knows that things read, heard or seen with interest are better remembered than those read, heard or seen with apathy.

In my opinion, the good Health Play is the most valuable method of teaching health to young children. The dramatic instinct and love of pageantry are inherent in most children, and wise teachers will seize upon these interests as a means of helping children to instruct themselves. The child, while being conscious only of amusement and pleasurable action, is unconsciously absorbing the health lesson conveyed by the play. Not only is this true of the actor, but it is also true of the audience, particularly if the costumes are attractive, and the acting is devoid of self-consciousness.

Great care should be taken in the selection of these plays. The health lesson should be positive in character. We can very well dispense with the ugly monsters and the grinning imps of disease. A stronger appeal can be made through the beauty of good health than through the fear of bad health. The play should have literary merit to the same extent as health stories, and health verses should have. The way in which the Mother Goose Rhymes have been mangled in order to produce health verses of very doubtful value from any point of view should be a warning to all teachers of health in their choice of material.

I have made a rather careful selection of good health plays, and these have been published from time to time in “The Canadian Red Cross Junior”. Children should be encouraged to compose their own health plays. I know of one composed by a ten-year-old boy in Calgary which, though short and simple, is one of the best I have seen.

Besides the Health Play acted by the children themselves, Marionette theatres can be used to great advantages. The “Mary Gay Suit Case Theatre”, devised by Stella Booth of New York, has been used with rather wonderful results in the way of getting children interested in health habits. The Mary Gay characters and stories are so charming, that one wishes every teacher of young children might be equipped with

one. The theatre takes only a few minutes to set up, and only a table or desk is required in the way of equipment. It can be carried as easily as an ordinary suit-case and is quite light.

The next best method I should recommend is to get the children to make Health Posters. Can you yourselves recall your first box of paints, and the joy of creating lovely daubs of color that it gave you? Seize upon this innate love of artistic creation for your health teaching. When a child uses his own ideas to illustrate a health truth, that health truth becomes his own for all time.

Health stories arouse interest in health truths, but more particularly so if the children write the stories themselves. The market is flooded with trashy health stories, and I should advise against the indiscriminate reading of these to children. There are a few good ones, such as "Jack O'Health and Peg O'Joy", published by Scribners, and "The Land of Health", published by Merrills. I am greatly opposed to reading to children health stories which do not conform to the requirements of good literature. This is even more to be guarded against in connection with verse. Most of the health verses I have seen are atrociously bad, and, in my opinion, should never be learned by children. If the teaching of good literature is effective in our schools, it will create in the children a feeling of disgust for the trashy, and this will re-act on the health truth you are seeking to teach.

The movie screen and lantern slides may be used to advantage in teaching health. In this field, too, a good deal of discrimination needs to be exercised.

But besides these indirect methods of conveying health teaching, there comes a time when hygiene should be given a definite place on the programme of studies. Up to nine or ten years of age the teacher's one object is to get children to practise health habits. At about that age, children begin to question why they should do things that they formerly took for granted. If we wish to sustain an intelligent interest in health, we should at this period introduce a systematic and interesting course in sanitation and physiology, simply for the purpose of teaching the child why he should practise health habits.

As Professor Winslow has so forcibly pointed out in an article on "Formal Instruction in Hygiene":—

"Habit formation should no doubt be our first aim, but it is by no means our only aim. We must also lay a sound basis of knowledge if the child is to be something more than an automaton—if it is not only to learn certain tricks, but is also to acquire intelligence which will enable it to modify its habits to meet the changing conditions of its after life. With every year health problems loom larger in our community life, and if the citizen is to deal competently with

such problems he must know something more than that he was taught in school to brush his hair in the morning, to operate the tooth brush with a rotary motion, to eat carrots and drink milk. I believe then we may advance as a fundamental postulate that a programme of school hygiene should include not merely the formation of health habits immediately necessary to the child, but also the acquisition of a certain basic body of knowledge which will be necessary for the continuance of healthy living in the future".

For instance, I should suggest that we introduce physiology in some such way as this:—

The framework of the body.

Posture.

The digestive system.

A healthful diet.

Simple physiology of the teeth, eyes, ears, skin.

Adenoids, and enlarged tonsils.

Care of the teeth.

Care of the eyes.

Care of the ears.

Care of the skin.

Before children leave the elementary schools they should receive instruction in elementary sanitation, such as:—

- (a) Disease germs, how they get into the body, how they are spread, and resistance to disease germs.
- (b) Information regarding the ordinary communicable diseases.
- (c) Explanation of contact infection, and disinfection.
- (d) Pure water, clean milk, sewage disposal.

In the final grade of the elementary school a slightly more advanced course in physiology than was possible in the earlier grades should be given. In addition to this, First Aid for commonly occurring school accidents should be given.

To reach the highest degree of perfection, health teaching should be combined with other school lessons. It can be so combined with practically every subject on the curriculum. For instance, the reading primers should have some attractive lessons on health habits in story form. Certainly, there should be nothing in the reading primers which will neutralize the teaching of health habits. I should advise all those who are interested in the teaching of health in the schools to look carefully through the primers and other reading texts in use in your particular province. In a certain part of Canada, which I shall not designate, there is a text book on Hygiene which states that growing children should not drink tea or coffee, but in the authorized primer

there is a lesson entitled "The Tea Party"; which makes the drinking of tea and coffee appear very attractive. The teaching of Hygiene can be very conveniently combined with the teaching of even arithmetic, *e.g.*:

- (1) How many glasses of milk should each pupil drink in a day?
- (2) How many would that make for the whole week?
- (3) How much should the whole class drink in a day?
- (4) If milk is selling at 7 cents a pint, how much does the proper amount for one pupil cost for a day? for a week?

I have previously indicated how it can be combined with composition, dramatic expression and art. Indeed, the teacher who has grasped the idea can work it through the whole curriculum.

The real goal of all our efforts in the teaching of health in rural schools or anywhere else is to induce children to put into practice the elementary laws of health, and to do these things over and over sufficiently often until they become fixed as habits. Let us assume that we have provided children with ideal hygienic environment at school, have eliminated all remedial physical defects, and have taught them exactly what they should do in order to conserve their own health and that of others; still we have fallen short of our purpose unless we can bring to the child's attention a sufficiently powerful motive to move his imagination and will, so that knowledge may be transmuted into action. It is quite possible for a child to know all the elementary facts of health and yet practise none of them. We are confronted with the fact that the best of teaching may remain sterile, for lack of a strong motive in the child's own soul.

Sir George Newman, in a memorandum on "Public Education in Health", makes the following comment:—

"It is obviously idle and redundant to instruct people how and in which direction they should brush their teeth if they have no desire or intention of brushing them at all. They need stimulation, not merely instruction. To arouse enthusiasm and a desire for good health, to awaken a health conscience, this may be called the stimulative function of a voluntary organization".

It is at this point that Junior Red Cross enters the field of Health Education. Although there is much more involved in Junior Red Cross than its health programme, still, I must confess that it first appealed to me because I saw in it a mighty tool, for making effective our health teaching in the schools.

From seeing the results of Junior Red Cross in operation in schools in Canada, and more recently in European countries, I am convinced that it does create in the child a strong desire for health for himself and for others. I find it difficult to explain how it works as an impelling motive, but this is how I think it works. Because Junior Red Cross

belongs to the children—they appoint their own officers and conveners of committees, and their meetings are conducted according to a simplified but correct Parliamentary procedure—and because there stand behind the members the traditions and ideals of unselfish service of the Red Cross, and because they are linked up, not only with a great national but also a great international organization with its 8,000,000 child members throughout the world; because they are working together in a real co-operative undertaking; chiefly, I think, because this movement appeals to the spiritual forces latent in all children, there comes to the child who voluntarily becomes a member a strong desire to put into practice the programme for which Junior Red Cross stands. One of the chief points in this programme is health for oneself and for others.

An inspector in Prince Edward Island, speaking at provincial teachers' conventions, stated that the first thing that attracted his attention to Junior Red Cross was the fact that, wherever it was established, the common drinking cup had disappeared. On investigation he found improvements of a similar nature.

In Central Europe you can tell some distance away whether a school has Junior Red Cross or not, by noticing whether the windows are open. Even in the primitive mountain villages of Slovakia, wherever a Junior lives, there you find bedroom windows open at night. Those of you who know Central Europe know how revolutionary this is.

In our own rural schools of Canada Juniors prepare hot school lunches, they abstain from tea and coffee, they eat fruit, vegetables and whole wheat bread, they practise habits of personal cleanliness and of good posture. In fact, wherever you find Junior Red Cross organized you will find the members earnestly and energetically practising health habits. Just one more instance and I am through. A Medical Inspector in Toronto told me of a boy in one of the schools of his district who was incorrigibly dirty. Teacher, public health nurse, and the doctor himself had all tried to get him to clean up, but to no avail. Finally, Junior Red Cross was organized in that room, and by a subtle move on the teacher's part this boy was made chairman of the cleanliness committee, with the result that he not only came to school spick and span himself but he insisted on all the other members doing likewise.

To quote a phrase which appears in a publication of the London County Council, written by Sir William Hamer, the members of the Junior Red Cross really become "guardians of their own health", and I believe there is an increasing body of teachers, public health nurses, and doctors in this country who consider it an almost indispensable aid in the practical teaching of health in our schools.

*Read at the Canadian Health Congress, Toronto, May 5th, 1926.



The Provincial Board of Health of Ontario

Communicable Diseases Reported for the Province by the Local
Boards of Health for July, 1926.

COMPARATIVE TABLE

Diseases	1926		1925	
	Cases	Deaths	Cases	Deaths
Cerebro Spinal Meningitis	6	3	—	4
Chancroid	1	—	1	—
Chicken Pox	503	—	330	—
Diphtheria	183	14	151	19
Encephalitis	5	4	—	10
Gonorrhoea	131	—	144	—
Influenza	—	10	—	5
German Measles	150	—	6	—
Measles	1955	8	642	—
Mumps	37	—	108	—
Pneumonia	—	137	—	77
Poliomyelitis	—	—	4	—
Scarlet Fever	289	3	252	3
Small Pox	41	—	8	—
Syphilis	118	—	65	—
Tuberculosis	177	72	158	82
Typhoid	57	—	57	3
Whooping Cough	325	3	345	9

The following Municipalities reported cases of Small Pox:—Belle-ville 6, Madoc Tp. 1, Peterboro 9, Ottawa 2, Richmond Tp. 2, MacTier 9, Medora Tp. 1, Kingston 4, Chatham 1, Carleton Place 1, Parry Sound 4, Toronto 1.

J. W. S. McCULLOUGH.

News Notes

The Osler Memorial Volume, published under the auspices of the International Association of Medical Museums, may be secured from the managing editor, 836 University Street, Montreal, at \$10 a copy.

HEALTH NEWS, published by the New York State Department of Health, quotes the director of the department of sanitation and surgery of the Pullman Company to the effect that before a negro is employed by the Pullman Company as porter, he must be vaccinated or show evidence of a recent successful vaccination. The physician making the examination must satisfy himself that the scar is less than 5 years old, and if older the applicant for employment must be reinoculated. There are about 12,000 negroes employed by the Pullman Company as porters.

Honourable Dr. W. F. Roberts, St. John, New Brunswick, has been appointed director of the Department of Physiotherapy at the General Hospital.

The fifty-fifth annual meeting of the American Public Health Association will be held at Buffalo, October 11-14, with headquarters at the Hotel Statler. The regular conference of the New York State Health Officers and Public Health Nurses will be held in conjunction with this meeting and will present a separate programme, October 12; there will be special sessions on mental hygiene, the teaching of health in colleges, and milk supply; particular attention will also be given the subjects of measles, ventilation, the pollution of boundary waters, and rural hygiene; in all, 140 speakers are listed on the programme.

The International Union against Tuberculosis meets in Washington, D.C., on September 30th to October 2nd. The National Tuberculosis Association also meets in Washington from October 4th-7th.

The Child Welfare Conference planned for Vancouver in September has been postponed until next year. The Annual Meeting of the Child Welfare Council for this year will be held in Ottawa on October 29th.

The ninth congress of the Association of French Speaking Physicians of North America meets in Montreal, September 21st to 23rd.

Editorial

THE LATE DR. LAIDLAW

By the death of Dr. William Charles Laidlaw, Deputy Minister of Health, of the Province of Alberta, Canadian Public Health suffers a great loss. Although he contributed comparatively little to medical literature, he was well known and highly regarded not only in the Province of Alberta, but throughout the Dominion. He was ever alive to all that was new in the public health field, and helped by his ardour and encouragement to stimulate the work of his associates.

Dr. Laidlaw was born in Stayner, Ontario, 52 years ago. He was educated at Upper Canada College and the University of Toronto, from which he graduated in Medicine in 1895.

At Toronto he was prominent in student activities and played quarter-back for the University of Toronto Rugby Team of his day. He was a member of the Zeta Psi fraternity.

After graduation he spent a year with the Ontario Government in the institute for Mental diseases at Orillia, and later went to Edinburgh for a year's Post-Graduate study.

He commenced practice in Edgar, Ontario, but this was interrupted by the call to arms for the South African War. He served throughout this campaign with great distinction and was awarded the distinguished conduct medal.

After the war he returned to Canada and began practice at Carstairs, Alberta. He displayed considerable interest in Public Health work, and in 1912 was appointed Medical Officer of Health, for the Province of Alberta.

In 1914 he again responded to the call of his country and left Canada as Medical Officer to the 4th Artillery Brigade. His talents were soon directed into his chosen field, and he was given command of No. 1, Sanitary Section, later being promoted to the rank of Major, and appointed advisor in Sanitation to the Canadian Corps.

After the Armistice, Dr. Laidlaw returned to his former position in Alberta, and in 1921 was appointed Deputy Minister of Health—a ministry of Health having been created in the meantime. He took a deep interest in University affairs and was Associate Professor of Public Health, and also a member of the Senate of the University of Alberta. He was elected President of the Canadian Public Health Association in 1923.

He was the most loyal of friends, and always courteous and dignified and kindly in his judgment of others. He took a great human interest in everyone. He was punctual in his doings and always calm and collected and of excellent judgment. These qualities, together with his power of expressing himself logically and the moderation of his counsels, made him a valued colleague and an unusually efficient Deputy Minister, and made his services much sought for on committees of various sorts.

He was a master of the art of pouring oil on troubled waters and most tactful.

By his death the state is the poorer. The profession and his friends are the better for having known him.

He had been suffering from myocarditis for a few months, and died during his sleep in the early morning of August 15th, 1926, at his residence in Edmonton; his wife and daughter survive him.

HEALTH EDUCATION

To many of us fully informed as to the fact that most communicable disease is definitely preventable, the neglect of preventive measures by persons who we think should know better is a constant source of exasperation. Diphtheria, smallpox, scarlet fever, typhoid fever, tuberculosis, and even the common cold, which does much more damage than it is credited with, are constantly prevalent. This condition of affairs is to a large degree the result of the fact that people will not take the trouble to protect themselves. Surely this must be the case if protective methods are available and unused.

We should remember, however, that human beings are largely creatures of habit, and while health leaders know the facts as to the preventability of disease, and have done something to inform the public as to the truth, that something is generally not enough. The fact that publicity is occasionally given to some fact or facts concerning health conservation does not justify us in assuming that people generally are going to immediately jump to take advantage of their opportunities.

The case of smallpox is a good example of how things work out. In spite of the fact that a preventive measure of the greatest value has been available for over a hundred years, there are still large areas where vaccination is not general. On the other hand, the lapse of a century since Jenner's discovery has meant that people generally have got used to vaccination, and have accepted the necessity for vaccinating their children largely as a matter of course. On the whole the civilized world

is fairly thoroughly vaccinated. This is the result of constant reiteration of the value of preventive procedures over a long period of time.

In the case of the newer methods of disease prevention where educational propaganda has scarcely had time to make itself felt, it is scarcely to be wondered at that such procedures are not yet generally in use. The unfortunate result is that the children of our own generation are suffering in spite of the fact that preventive measures undiscovered in the time of previous generations are available. The lesson is that only by a multiplication of our present methods of educating the public can we attain quick results.

The health officer, and indeed physicians generally, who have a distinct duty in the matter, should, it would seem, take a greater interest than in the past in the study of methods for keeping the public informed as to the newer discoveries, as well as developing a general sense of responsibility as to personal health on the part of people generally. In this direction there lie tremendous possibilities, the existence of which on the whole few of us have as yet realized. The poster, the pamphlet, the radio address, the newspaper article dealing with health, are a means to this end. More important is a general realization of the fact that public education along health lines utilizing every available method is essential if human beings are to live longer and happier lives.
